

**WHAT IS CLAIMED IS:**

1. A multi-hop communication system configured by a radio control station connected to a core network and radio stations that relay a signal transmitted from other radio station, wherein, the radio control station comprises:

a control signal transmission/reception unit configured to transmit/receive a control signal for conducting communication with the radio station;

an information signal transmission/reception unit configured to transmit/receive an information signal; and

a communication route determiner configured to determine a communication route for the control signal and a communication route for the information signal by different independent processes, and the radio station comprises:

a control signal transmission/reception unit configured to transmit/receive the control signal; and

an information signal transmission/reception unit configured to transmit/receive the information signal.

2. A multi-hop communication system configured by a radio control station connected to a core network and radio stations that relay a signal transmitted from other radio station, wherein, the radio control station comprises:

a control signal transmission/reception unit configured to transmit/receive a control signal for conducting communication with the radio station;

an information signal transmission/reception unit

configured to transmit/receive an information signal; and

a communication route determiner configured to determine a communication route for the control signal by a different independent process from determination of a communication route for the information signal, and the radio station comprising:

a control signal transmission/reception unit configured to transmit/receive the control signal; and

an information signal transmission/reception unit configured to transmit/receive the information signal.

3. A radio control station connected to a core network and controls communication by a radio station that relays a signals transmitted by other radio station, comprises:

a control signal transmission/reception unit configured to transmit/receive a control signal for conducting communication with the radio station;

an information signal transmission/reception unit configured to transmit/receive an information signal; and

a communication route determiner configured to determine a communication route for the control signal.

4. A radio control station according to claim 3, the communication route determiner determines a communication route for the information signal by a different independent process from the determination of the communication route for the control signal.

5. A radio control station according to claim 3, the communication route determiner transmits a communication route acquisition request to the radio station for acquisition of a

communication route, and the communication route determiner determines a communication route based on a response to the communication route acquisition request transmitted by the radio station.

5 6. A radio control station according to claim 3, further comprising a communication channel controller configured to transmit a usage notification that indicates usage of a communication channel handled by the radio control station.

7. A radio control station according to claim 3, the  
10 communication route determiner determines a communication route to the radio station and transmits a communication route determination notification that notifies the communication route to a radio station located on the communication route.

8. A radio control station according to claim 7, the  
15 communication route determiner assigns a communication channel to be used in the radio station located on the determined communication route.

9. A radio station conducting communication via a radio control station connected to a core network, comprising:

20 a control signal transmission/reception unit configured to transmit/receive the control signal;

an information signal transmission/reception unit configured to transmit/receive the information signal; and

a communication route determiner configured to determine  
25 a communication route for the control signal and a communication route for the information signal by different independent processes.

10. A radio station according to claim 9, the communication route determiner transmits a usage inquiry to the radio station for inquiring usage of a communication channel handled by the radio control station and transmits/receives the information signal according to a usage notification that is a response to the usage inquiry.

11. A radio station according to claim 9, further comprising a decision unit configured to decide whether or not communication is directly conducted with the radio control station based on a reception level of the control signal received by the control signal transmission/reception unit.

12. A radio station according to claim 11, the decision unit changes a threshold for the reception level according to a transmission speed of the information signal and to decide whether or not communication is directly conducted with the radio control station based on a result of comparison of the reception level and the threshold.

13. A radio station according to claim 9, further comprising a first relay controller configured to transmit a relay control signal to other station for requesting a relay of the information signal and to set a communication route to the radio control station via the other station according to a response relay control signal that is a response to the relay control signal.

14. A radio station according to claim 13, further comprising a communication route selector configured to select a radio station satisfying a prescribed condition regarding a communication state if a plurality of the other radio station

transmitted the response relay control signal.

15. A radio station according to claim 9, further comprising a second relay controller configured to receive a relay control signal requesting a relay of the information signal from other station, to transmit a response relay control signal that is a response to the relay control signal and to set a communication route from the other radio station to the radio control station.

16. A radio station according to claim 15, the second relay controller transmits the response relay control signal notifying ability of the relay of the information signal based on a reception level of the received response relay control signal.

17. A radio station according to claim 14, wherein an information indicating a number of hops from the other radio station to the radio control station is included in the response relay control signal, and the communication route selector selects a radio station based the number of hops included in the response relay control signal.

18. A radio station according to claim 14, wherein an information indicating an interference level is included in the response relay control signal, and the communication route selector selects a radio station based the interference level included in the response relay control signal.

19. A multi-hop communication method used in a system configured by a radio control station connected to a core network and radio stations that relay a signal transmitted from other radio station, comprising:

a usage inquiry step that the radio station transmits a

usage inquiry for inquiring usage of a communication channel handled by the radio control station using a control signal for conducting communication with the radio control station;

5 a communication route determination step that the radio control station determines a communication route for the control signal and a communication route for the information signal by different independent processes;

a usage notification step that the radio control station transmits a usage notification indicating usage of the  
10 communication channel handled by the radio control station; and

an information signal transmission step that the radio station and the radio control station transmit/receive the information signal using the communication route according to the usage notification.

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